

Brazilian and French researchers prepare solar cells of the future

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Mr. Guilherme Osvaldo Dias is a PhD student working on Semiconductors and Photonics, of the State University of Campinas - São Paulo, CCS, DSIF in Campinas, Brazil. He visited the MINATEC research centre in nanotechnology of the Atomic Energy Centre CEA in Grenoble, France, during the spring of 2008.

What have you worked on during your visit?

We produced samples containing silicon nanocrystals (Si-nc) which should be applied in optoelectronics. In part of the work we characterized the material's structural and optical properties.

Why is that important for your research and for progress in nanotechnology?

The idea was to produce samples containing very thin layers of silicon rich silicon oxide (SRSO) to obtain Si-nc from it. We treated the material with heat, by adequate thermal treatments. With these very thin layers (~3nm) we have tried to control the size and spatial distribution of Si-nc. This is a key part in the research on silicon nanotechnology, controlling the size and spatial distribution of Si-nc, which permits engineering optoelectronic devices. Furthermore, this subject is related to my PhD in Brazil.

Why did you come to this European research centre to do this project?

MINATEC has good facilities to produce samples and characterize, mainly, the structural properties, with advanced instruments like the Transmission Electron Microscope (TEM).

What are the results? How will you disseminate them?

Up to now, we have obtained the samples with thin layers and made the first structural and optical characterizations. The results showed that we need to make some refinements in the process parameters to obtain better conditions, and that we are on the right path. It's necessary to point out that this kind of work necessitates several steps, like adjustments of process parameters, which depend on the particular system used to produce samples. The type of Chemical Vapour Deposition system LPCVD used in MINATEC is a good system to produce our samples and we believe we can achieve good results by refining the process. The main way to disseminate results will be through the publication of paper(s) in specialized journals and/or scientific conferences.

Is this the first contact between both organizations or is your visit part of existing collaboration?

This was my first contact. There was no collaboration between Centre for Semiconductor Components (CCS) at State University of Campinas (Unicamp) and MINATEC before.

What are the plans for future collaboration?

We are planning to establish collaborations through PhD and Post-doc research projects. The idea is to produce samples containing Si-nc and afterwards to develop devices for optoelectronic applications. The projects would be carried out by interchanged PhD students and/or Post-doc researchers.

Do you intend to apply for funding in the EU 7th Framework Programme for RTD?

Up to now there is nothing planned by us for application. But it would be a good opportunity to carry out a project in the area of photovoltaic devices. For example, in solar cells we could develop prototypes containing Si-nc to enhance the gain.

How may your project in the long term benefit the development of your country or Latin America in general?

The benefits can be several. My project is related with applications in optoelectronics through the study of nanometric semiconductor structures. The whole future of the emerging field of nanotechnology is based on this subject. The interchange of experience with the well trained researchers working in MINATEC can contribute to enhancement of research in this specific area of nanoscience in my country. The results from such collaboration can lead to increases in funding applications to the Brazilian government to be applied in the area of nanoscience and nanotechnology. So, even though we have not attained up to now the final aims of our research, the collaboration work was very fruitful. New ideas have arisen in the course of our work at MINATEC, I have gained valuable experience and the possibilities of future work have been enhanced through collaboration projects we intend to put in practice.

What are your plans for disseminating the results of your visit outside the research community in your country?

For me, the best way to disseminate the results outside the research community can be through an event that occurs annually in my University (Unicamp), called “Universidade de Portas Abertas (UPA)” – “University with opened doors”, in a direct translation. Through this event Unicamp receives several visitors, mainly students from high school, which visit several faculties and several laboratories in the university. So, is possible through this event to give explanations and make presentations to people during their visit to my research centre (CCS).

Identification:

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About NANOFORUMEULA

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